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AMMUNITION FOR FIGHTING A DEMAND-SIDE WAR ON DRUGS: A REVIEW OF CONTINGENCY MANAGEMENT IN SUBSTANCE ABUSE TREATMENT

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In March, 2007, U.S. President George W. Bush completed a five-nation tour of Latin America. Many of these nations are on the front lines of the decades-old U.S. war on drugs. As many readers are aware, a major component of the strategy employed by the U.S. in fighting this war has been what economists call supply-side efforts. The strategy is simple: If one can reduce the supply of drugs on U.S. streets, this will drive prices up and, as any economist will tell you, as price goes up, consumption declines. Thus, the U.S. spends over a billion dollars annually eradicating coca fields in Columbia, breaking up drug cartels in Mexico, and arresting and imprisoning drug dealers in the U.S. This supply-side strategy has strained relations between the U.S. and its allies. Afghanistan's President Hammed Karzi, for example, recently refused U.S. pressure to allow herbicidal spraying of its poppy fields under fear of popular uprisings against the Kabul government. Similarly, Mexico's President Felipe Calderon recently complained to President Bush that Mexican officials are putting their lives on the line in the drug war while the U.S. makes little more than "symbolic gestures" to curb its insatiable appetite for drugs.

The supply-side approach has also strained the pocketbooks of the U.S. taxpayer. From fiscal years 2002 to 2008, the U.S. appropriated nearly 37% more money to the drug war, with virtually all of the additional expenditures allocated to supply-side efforts (Carnevale Associates, 2007). From 1980 to 2002, the U.S. witnessed an 11-fold increase in the number of drug-related incarcerations, at an estimated annual cost of at least $25,000 per inmate (Caulkins & Reuter, 2006). Unfortunately, these efforts have not reduced drug consumption via widespread price increases. Instead, the purity-adjusted street price of heroin and cocaine has declined by an estimated 75% (Caulkins, 2000), and over the last two decades there have been no systematic decreases in the availability of drugs on the streets (Caulkins, Reuter, Iguchi, & Chiesa, 2005) or in U.S. high schools ("Surveillance Summaries," 2004).

By most accounts, the supply-side approach to the drug war has either been enormously cost ineffective or an outright failure (Kuziemko & Levitt, 2004). These assessments probably play a role in what appears to be a shift in public support toward exploring demand-side, treatment-based approaches to reducing drug use and addiction. For example, in 2000, 61% of California voters approved Proposition 36, which required nonviolent drug offenders to spend time in treatment rather than in jail. This is landmark legislation, and if it proves successful, it may help to maintain momentum toward a demand-side approach.

Unfortunately, there is reason for skepticism. A treatment-based approach to the war on drugs is only as good as the treatments employed. Although the best psychosocial approaches to substance abuse have been shown to produce better outcomes than no-treatment controls (an outcome that is difficult to get excited about), many community-based treatment providers do

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not implement these therapies in a systematic fashion. With no oversight from a body comparable to the American Medical Association, some providers may even use therapies such as insight psychotherapy or confrontational counseling that have proven to be either ineffective or counterproductive (Bottlender, Köhler, & Soyka, 2006). Keeping the pendulum of public support swinging toward a demand-side approach to the war on drugs will require a cost-effective treatment program that produces long-term outcomes that are significantly better than existing treatment-as-usual therapies.

Enter the work of behavioral scientists who, since the 1970s, have demonstrated in controlled clinical trials that drug use could be effectively reduced by arranging contingencies of reinforcement for drug abstinence. In the decades since, contingency management (CM) therapy has been extensively studied and refined to the point that it is demonstrably more effective than the usual psychosocial approaches to treating a wide range of substance abuse disorders. Reflecting these successes, in 1999 the National Institute on Drug Abuse selected reinforcement-based CM treatment of substance abuse as one of the first approaches to be explored in the Clinical Trials Network, an attempt to bridge the gap between university-based clinical research findings and the practices of community-based substance abuse treatment providers (e.g., Petry et al., 2005). The generally positive outcomes of these trials and those from decades of clinical trials documenting the efficacy of CM therapy should be in the hands of every government official who plays a role in shaping our public drug policies. Luckily for us, getting such information into the hands of these officials will be substantially easier with the publication of Higgins, Silverman, and Heil's *Contingency Management in Substance Abuse Treatment* (2008; hereafter *CMSAT*).

CMSAT is the outgrowth of a conference on CM therapy held at the University of Vermont in 2004. This was the second conference devoted exclusively to CM therapy; the first was held in 1995 and also resulted in a book (Higgins & Silverman, 1999). The present volume represents a substantial update—18 chapters, organized into three thematic sections, each containing summaries of important studies published (or soon to be published) since the release of the previous book. The first section of *CMSAT* is composed of seven chapters, the first of which is written by the book's editors and provides a historical overview of the basic and applied research that paved the way for the development of CM therapy. This chapter also provides a brief overview of techniques used in CM therapy and the efficacy of these techniques in producing biologically verified drug abstinence. These overviews provide a nontechnical summary that may be useful in communicating with those in policy-making positions within a clinic, organization, or government. Particularly useful for these audiences is the simple but explicit conceptualization of drug taking as operant behavior demonstrably affected by the reinforcing consequences of the drug and amenable to concurrent contingencies of reinforcement and punishment.

The next six chapters of *CMSAT* are more technical, intended as they are for graduate students and researchers studying the treatment of drug abuse. Each of these chapters provides a comprehensive survey of the application of CM therapy in its various forms to the treatment of a specific drug of abuse. Each is written by a research team that has contributed important findings to the CM literature. In order of appearance, chapters 2 to 7 cover the efficacy and challenges faced in treating use and abuse of cocaine (Higgins, Heil, Rogers, & Chivers), opiates (Epstein & Preston), marijuana (Budney & Stanger), methamphetamine (Roll & Newton), tobacco (Sigmond, Lamb, & Dallery), and alcohol (Wong, Silverman, & Bigelow). Together these chapters give the reader an appreciation of the substantial gains

in treatment efficacy that have been made in the treatment of each of these drug use disorders through years of controlled, parametric research. Although the focus of each of these chapters is on a single drug of abuse, they also address polydrug abuse, in which one of the abused drugs is the focus of the chapter. This results in some unavoidable redundancy but makes each chapter ideal for a graduate course or for clinicians with specific needs.

The second section of *CMSAT* contains five chapters illustrating the variety of special populations to which CM therapy has been recently disseminated. Chapter 8 (Rounsaville, Rosen, & Carroll) illustrates the use of the CM approach outside the treatment of substance use disorders. Here we learn how these contingencies can be adapted to enhance patient compliance with prescription medication regimes such as those required in the treatment of HIV and tuberculosis, or those that may aid in substance abuse treatment (e.g., disulfirum). Chapters 9 (Milby & Schumacher) and 11 (Tidey & Ries) return to the drug treatment arena in their descriptions of programs specially designed for the extensive needs of homeless and mentally ill drug-dependent individuals, respectively. In the first of these chapters, details and data are provided on a series of studies conducted by this research team to identify the critical components of a comprehensive day-treatment, job-training, and housing program designed to reduce drug taking among the homeless. Their years of research provide an excellent example of how independent effects of treatment components may be empirically identified with the goal of providing a cost-effective intervention that maintains long-term drug abstinence. In the latter of these chapters, empirical evidence is provided, demonstrating that CM therapy can significantly reduce stimulant, marijuana, alcohol, and tobacco use among schizophrenic outpatients, a population in which substance use is prevalent and treatment success is uncommon.

The remaining chapters in the second section of *CMSAT* discuss important extensions of CM therapy to meet the specific needs of substance-dependent pregnant women (Heil, Yoon, & Higgins) and adolescents (Krishnan-Sarin, Duhig, & Cavallo), the latter being a particularly difficult-to-treat population in part because they have not yet sampled the long-term negative impacts of their drug use. These first 12 chapters of *CMSAT* do such a fine job of showing how the present efficacies of CM therapy are the product of systematic scientific research that they provide confidence that the remaining challenges (which are unflinchingly pointed out by the authors of these chapters) will be met in the coming years. In identifying these challenges, the contributors to the book provide quantitative data on critical measures such as the percentage of participants who respond to treatment, mean periods of biologically verified drug abstinence in those receiving CM or another form of therapy, and the costs of giving monetary or other tangible reinforcers contingent on drug abstinence. These numbers reveal three remaining challenges: (a) Some substance-dependent individuals do not benefit from CM therapy, (b) the benefits of CM therapy frequently do not last after treatment ends, and (c) CM therapy is expensive.

From the perspective of an outsider looking in through the window of *CMSAT*, it appears that everyone in the CM research arena is aware of these three major challenges, and the final section of *CMSAT* describes some of the important demonstrations that these challenges can be met, particularly the challenge of reducing costs. These challenges are not unique to the treatment of substance use disorders; therefore, a small sampling of these efforts is provided here.

Challenge 1: Universal Efficacy

Although universal efficacy is a goal yet to be accomplished, one must not lose sight of the fact that CM therapy yields abstinence rates that

typically double those of treatment-as-usual control groups. The research practices and outcomes summarized in the first seven chapters of *CMSAT* suggest that these successes are contingent on following a number of best practices. For example, not surprisingly to readers of this journal, CM therapy is more effective when immediate reinforcers are given contingent on biologically verified drug abstinence. Likewise, students of the matching law, behavioral economics, and establishing operations will not be surprised to learn that CM therapy is more effective when clinicians increase the magnitude of substitute nondrug reinforcers so that these reinforcers can more effectively compete with drug reinforcers by increasing in value with duration of continuous abstinence (see chap. 5 by Roll & Newton for an eloquent analysis of these concurrent reinforcers). Our lack of surprise at these outcomes does not reduce the importance of the years of carefully controlled research summarized in *CMSAT*. Quite the opposite, these clinical trials, which have employed group-statistical designs, have served to extend the generality of behavioral principles to one of the most socially important clinical phenomena facing industrialized cultures. Further, these studies have brought behavioral principles and procedures into a wider range of prestigious publication outlets (e.g., *Archives of General Psychiatry*, *Journal of Consulting and Clinical Psychology*), thereby increasing the visibility of these techniques and outcomes.

Observing that behavioral principles underlie the present efficacies of CM therapy, the authors of *CMSAT* turn their attention to how these principles might be used to increase abstinence rates. In chapter 2, Higgins et al. provide a review of efforts to combine CM therapy with the community reinforcement approach (CRA), a program pioneered by Azrin and his colleagues in the 1970s. CRA is designed to encourage non-drug-related activities that can be maintained by community-mediated reinforcers (e.g., working or going to the movies). Thus far, the effects of adding CRA on drug abstinence have been modest and temporary, but CRA does appear to improve other important outcomes such as retention in treatment and improved vocational status. By contrast, results summarized in the same chapter reveal that other forms of add-on therapies (e.g., cognitive behavior therapy) have not produced consistent improvements over CM therapy alone either during or after treatment. However, ample evidence summarized in the first seven chapters of *CMSAT* demonstrates that adding CM therapy to more traditional forms of talk therapy significantly improves abstinence outcomes.

Other efforts to improve CM efficacy are covered throughout *CMSAT*, and one must be impressed with the breadth of these approaches, from placing additional contingencies on compliance with a therapeutic medication regime (chap. 8, Rounsaville et al.) to enlisting the aid of a social supporter who earns incentives when the recipient of his or her support achieves abstinence (chap. 10, Heil et al.). Another strategy deserving of comment has been to adopt a shaping approach to drug abstinence; a well-organized review of this work is provided in chapter 6 by Sigmond et al. Here we learn of attempts to use percentile schedules of reinforcement (see Galbicka's 1994 summary of this procedure) to reinforce successively lower rates of cigarette smoking until abstinence is achieved. A very limited number of studies have been conducted thus far, but their outcomes are encouraging, particularly because the participants were individuals with no desire to quit smoking. If these findings are reliable and generalizable to other drug addictions and if optimal methods of adjusting the percentile schedules can be determined, then this procedure may hold promise for programs like California's Proposition 36 in which substance-dependent individuals are required by the courts to participate in drug abuse treatment.

Challenge 2: Posttreatment Relapse

In chapter 2, Higgins et al. provide a summary of attempts to reduce posttreatment cocaine relapse by adding a CRA program to CM therapy. As noted above, CRA attempts to improve the client's social relations, employment, and legal status with an eye toward making nondrug reinforcers available that might compete with drug taking once abstinence-contingent incentives are removed. The controlled studies reviewed by Higgins et al. illustrate the difficulty of finding naturally occurring reinforcers to compete with cocaine, in that successes have generally been limited to posttreatment improvements in areas other than cocaine relapse (e.g., vocational improvements). More encouraging preliminary findings are reported in chapter 9 by Milby and Schumacher, who review preliminary efforts to employ CRA-inspired programs to treat substance abuse in the homeless. Their initial findings suggest that adding these programs to CM therapy improves abstinence outcomes at long-term posttreatment follow-ups.

A second strategy is discussed in several chapters in the context of treating cocaine, marijuana, and tobacco dependence (chaps. 2, 4, and 6, respectively). CM researchers noticed that early and sustained abstinence during treatment was predictive of better posttreatment outcomes. Correlations like this are usually explained as individual differences, but a number of the contributors to *CMSAT* wondered if similar posttreatment outcomes could be experimentally produced by arranging larger magnitude reinforcers for drug abstinence during CM therapy. These interventions produced earlier and longer durations of drug abstinence during treatment. More surprisingly, these efforts have also produced longer durations of drug abstinence after therapy ends. These outcomes, to the extent that they prove to be replicable, will no doubt be attractive to community-based substance abuse providers who are all too familiar with relapse and to public policy makers who are none too keen on spending public finances on programs that produce only temporary outcomes.

Policy makers, however, may object to this second strategy because offering incentives to substance abusers presents an image of being soft on crime. These policy makers may find more to like in chapter 17, in which Donlin, Knealy, and Silverman discuss efforts to integrate CM therapy into the workplace so that it can either be continued indefinitely or may be more slowly faded as abstinence continues (excellent and complementary coverage of this integration is provided in chaps. 6, 9, and 16 as well). In these chapters the reader may learn how CM researchers have taken the CRA approach one step further by offering (contingent on biologically verified abstinence, of course) low-skills job training, a job with wages, and in some cases, housing to drug-dependent individuals whose skill levels are so low that they are unlikely to obtain employment on their own. As in all chapters in *CMSAT*, these authors provide concrete percentages of participants who are abstinent over time so readers can judge efficacy for themselves rather than having to derive it from a statistical p value. The results are impressive—long-term biologically verified abstinence, skills acquisition, and employment. What politician could resist this "off the streets and into the workforce" policy?

Challenge 3: CM Therapy Is Expensive

The final six chapters of *CMSAT* formally address the challenge of reducing the expenses associated with CM therapy. The importance of this challenge is illustrated in chapter 13, in which Stitzer and Kellogg provide a summary of early meetings between National Institute on Drug Abuse researchers and community treatment providers in the Clinical Trials Network, a large-scale effort to bring CM therapy to community substance abuse treatment clinics. In these meetings, community treatment providers viewed large payments for drug absti-

nence as patently unsustainable in their treatment settings. Not only are the monetary costs of the incentives beyond reach, but there are associated costs of conducting urinalysis tests, managing accumulated earnings, paying staff to manage contingencies in a best practices fashion, and so on. These are real barriers to the widespread dissemination of CM, and those considering this treatment model or attempting to convince other treatment providers to do so will benefit greatly from studying chapters 13 to15 and 17 of *CMSAT*.

One cost-cutting strategy adopted by the Clinical Trials Network is the "fishbowl" schedule of intermittent reinforcement. Chapter 14 by Petry and Alessi provides a thorough overview of this procedure in which abstinent clients randomly draw slips of paper from a fishbowl that contains prize descriptions ranging from "good job" (i.e., no tangible prize) to $100.00 prizes (e.g., television). In addition, the burgeoning fishbowl literature is reviewed in this chapter, with careful attention paid to quantifying savings and abstinence outcomes. Like so many of the chapters in *CMSAT*, Petry and Alessi are clear about the need for further research to examine optimal schedules of intermittency and variability of reward amounts.

As noted above, the social acceptability and long-term efficacy of CM therapy have been enhanced by integrating it into the workplace; however, this has also proven to be a cost-effective way of providing treatment when marketable services are provided by those in treatment. Likewise, by integrating CM therapy into existing government programs, such as supported employment programs for veterans (chap. 16; Drebing, Rounsaville, & Rosenheck) or the adult criminal justice system (chap. 18; Marlowe & Wong), cost barriers of more widespread use of CM therapy are overcome.

Conclusions

There are lessons in *CMSAT* for a wide audience. For the CM researcher, there are the results of scores of clinical trials designed to treat substance use in a particular population or to determine the efficacy of a particular component of a larger CM treatment package. This single outlet for so much information is a boon to those who wish to fill a gap in the existing literature with the long-term goal of increasing the efficacy of CM therapy.

For other behavioral scientists, there are creative uses of contingencies and further demonstrations that the efficacy of behavioral principles may be evidenced in clinical trials using group-statistical designs. Because these clinical trials are regarded as the gold standard of treatment outcomes by the wider community of clinicians, granting agencies, and government officials, those who wish to disseminate standardized behavioral interventions more widely may find utility in studying the dissemination successes summarized in *CMSAT*.

Most important, the book as a whole may help to remind us of a set of goals set forth by Skinner (1971) in *Beyond Freedom and Dignity*. Skinner suggested that a culture's survival may depend on its ability to arrange contingencies of reinforcement that yield behaviors that enhance the long-term productivity and sustainability of the culture and its members. He likened this lofty goal to the challenges faced in the Manhattan Project: The scientists who proposed the project did not possess the knowledge for building an atomic weapon; they only knew how to experiment, systematically consider the outcomes, and experiment some more. Although Skinner's grand vision of a government taking a scientific approach to all aspects of cultural design seems remote some 35 years later, *CMSAT* gives us hope that the envisioned approach to arranging positive reinforcement to address important cultural behavioral problems may make inroads in a piecemeal fashion. Like the Manhattan Project researchers, we do not yet know how to create a universally effective treatment that would make viable a demand-side approach to the war on drugs. However, CM researchers possess the

same tools that proved to be effective in unlocking the power of the atom: They know how to experiment, consider the outcomes, and experiment some more.

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